Fragile: Economic developments in many regions of the developing world increase pressure on limited water resources. (Photo: © Global Warming Images/Alamy.)

were "enduring one form or another of water scarcity".

In spite of water manufacturing capacity doubling between now and 2016, up to half the world's population will still be suffering shortage by the middle of the century, according to the GWI.

The cost of desalination is falling as a result of technological development, increasing the demand, and the cost of reusing water from sewage can be cheaper still.

New plants in Algeria are expected to deliver water for around 55 cents per cubic metre, and reuse from sewage can cost as little as 40–45 cents per cubic metre, considerably less than the cost of drinking water in the UK, but this includes piping it to taps, the GWI estimate.

One of the ongoing concerns about desalination, however, is the energy cost but plants are increasingly looking to renewable energy sources. Plants that do not use fossil fuels are being developed in the UAE, the UK and other countries, like Australia. Europe's largest desalination plant on the River Thames in London uses biodiesel.

Despite all these apparently sustainable water manufacturing developments, the Worldwide Fund for Nature remains concerned about building plants in often environmentally sensitive coastal and wetland areas and about the intake of seawater and discharge of the remaining concentrated brine, which can be contaminated with cleaning chemicals. "Desalination is, at best, a short-term solution."

And desalination can be of little help for some developing countries where growing demand for water occurs a long way from coastal or brackish supplies. Kenya's booming vegetable and flower growing businesses are centred inland and dependent on the river systems feeding Lake Naivasha.

Environmentalists have raised concerns about the amount of water now being extracted, highlighting the fragility of supply in many regions.

One of the most dramatic examples of overexploitation is that of the Aral Sea, between Kazakhstan and Uzbekistan, once the fourth largest inland sea. But years of extraction to irrigate crops in arid surrounding lands have seen it reduced to two remnants, less than 30 per cent of its former size.

While World Bank funds are now helping to reclaim the northern remnant, the sea is unlikely ever to achieve its former size.

And many more efforts are likely to be needed to protect environmentally important areas, while seeking to meet the inexorable rise in water demands around the world that water manufacture alone may not be able to solve.

China backs dam plans

Construction of Africa's largest dam is under way in Ethiopia as part of a series of projects with major implications for its neighbours. **Nigel Williams** reports.

In spite of the myriad concerns about the environmental impact of large dam projects, Ethiopia, with Chinese and Italian backing, has embarked on building the largest dam in Africa on the River Omo in the south of the country, with others planned too. The high plateaus of Ethiopia feed some of the continent's major rivers and it sees itself as the 'watertower of Africa'. At 243 metres high, the Gibe III dam on the River Omo, will put Ethiopia at the heart of hydroelectricity generation.

The new dam is part of a series of mega-dams that, by 2020, Ethiopia hopes will increase its power production 15-fold, and lead it to being a significant exporter of power in the region.

"For a developing country like ours the dams are a must," says Abdulhakim Mohammed, head of generation construction at the Ethiopia Electric Power Corporation. "Power is everything."

Gibe III will have a generating capacity of more than 1,800 MW — double what was available throughout Ethiopia last year. But the programme has sparked fierce opposition. Environmental groups believe a proper impact assessment has not been carried out.

Recently, a coalition of campaign groups, including International Rivers, based in California, and Survival International, launched an online petition with the aim of stopping the dam because of the potentially devastating social and economic effects on people downstream.

But the demand for more power is widely acknowledged. In rural areas, where most of Ethiopia's population live, only around two per cent of homes have access to electricity.

The geography of Ethiopia, with its mountains and high plains makes hydroelectric power appealing. Small rivers feed several major river basins: Lake Tana is the source of the Blue Nile and provides 85 per cent of its

Power: One of the many tributaries that feed Ethiopia's major river systems increasingly exploited for hydroelectric power. (Photo: Petra Putzier.)

water. The River Omo, site of the Gibe dam, flows south into Kenya and Lake Turkana. Some estimates suggest the country has the potential to generate 45,000 MW of hydroelectric power.

While work continues on Gibe III, Ethiopia has already approved plans for several new schemes, including a giant 2,100 MW project on the Blue Nile and a number of other dams have already been built or are close to completion.

The country has already started building transmission lines to Djibouti and Sudan and a supply agreement has been negotiated with Kenya. But the government's strategy faces a funding problem. Gibe III, costing more than $2 billion, needed external credit but the government went ahead and awarded the contract to Salini without tendering or carrying out an environmental impact study or consulting local communities. This goes against the policies of many external lenders and in 2008 an environmental study was finally carried out. The African Development Bank, which is considering a loan, is now carrying out its own review.

Although few people will actually be displaced by the dam and the huge reservoir it will create, up to 500,000 people living further downstream in the Omo valley could be adversely affected. And potential problems spread into Kenya, where Lake Turkana is fed by the River Omo. International Rivers say the dam will end the river's natural flood cycle which herders and farmers rely on in the arid land surrounding the lake. The lake itself is likely to see a fall in water level.

But the government has dismissed environmental concerns and turned increasingly to China for help, as have so many other countries and projects in Africa. The Chinese-owned Sinohydro, which helped build the massive Three Gorges Dam on the Yangtse river at home in China, has agreed to build the 1,600 MW Gibe IV dam further down the Omo, with the Chinese government providing the finance.

The potential for selling electricity is "tremendous", says Muhammed. "We will eventually connect to Egypt and possibly on to Europe," he says.

Hidden global trade in water

A new report highlights the embedded water in imports from developing countries. **Nigel Williams** reports.

While the problems of growing global demand for water are getting increasing attention, developed countries depend heavily on importing hidden 'virtual' water from places that regularly experience droughts and shortages, according to the UK's Royal Academy of Engineering.

Although the UK normally receives plenty of rainfall, it is estimated that two-thirds of all the water that its population of 60 million needs comes embedded in imported food, clothes and industrial goods. The result is that when people buy fruit and vegetables from parts of Asia and Latin America, they may be exacerbating droughts and undermining countries' efforts to grow food for themselves.

According to the report, the average Briton uses nearly 3,000 litres of imported water a year. One kilogramme of beef needs 15,000 litres of water to produce, more than 10 times the amount needed to produce the same weight of wheat. A t-shirt is estimated to require 2,700 litres of water to produce. "We must recognise how the UK's water footprint is impacting on global water scarcity," says Peter Guthrie, chair of the group of engineers who prepared the report. "The burgeoning demand for water from developed countries is putting severe pressure on areas that are already short of water. Our water footprint is critical," he said.

And the report highlights the great cost of moving water around. It says that it is estimated 19 per cent of electricity and 33 per cent of natural gas in California is used in water-related activities. The report highlights the growing concern in many countries and of many bodies at the impending crisis in water supplies. A recent World Bank report warned that more than 700 million people in 43 countries are now regularly affected by water scarcity and this is expected to grow as a result of climate change, population growth, and the switch to more meat-based diets in countries such as China.